

REMARKS

Applicant has amended claims 1, 5, 10, 17, 19, 25, 25, 29, 33, 35, and 38 and has added new dependent claims 44-46. In view of the above amendments and the following remarks, reconsideration of the outstanding office action is respectfully requested.

The Office has objected to claim 5 asserting there is insufficient antecedent basis for the phrase, "in claim 3 wherein the factor" in claim 5 and that claim 5 has interpreted as depending from Claim 4. Accordingly, Applicant has amended claim 5 to depend from claim 4 to correct the antecedent basis problem. In view of the foregoing amendments and remarks, the Office is respectfully requested to reconsider and withdraw the objection to claim 5.

The Office rejected claims 1-3, 6, 8-12, 15-20, 23, 25-27, 29-31, 33-36, and 38-43 under 35 U.S.C. 102(e) as being anticipated by US Patent No. 6,686,961 to Kubo et al. (Kubo), claims 4, 5, 13-14, 21-22, 28, 32 and 37 under 35 U.S.C. 103(a) as being unpatentable over Kubo in view of the Applicant's conceded prior art, and Claims 7 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kubo et al in view of US Patent No. 5,805,213 to Spaulding et al. (Spaulding).

The Office asserts that Kubo teaches providing digital image (Fig. 3, element 6), the digital image comprising a plurality of channels (fig. 7 shows R, G, and B separated for further processing) with each of the channels comprising a set of pixel data signals, and applying a filter to each of the sets of pixel data signals (34 and 31), wherein the filter applied to at least one of the sets of pixel data signals is different from the filter applied to another one of the sets of pixel data signals (col. 7, lines 57+). Additionally, the Office asserts that Kubo teaches that the set radius is different for the different filters (element 34 uses the two midmost values such as directly above, below, on the right of, and on the left of the central pixel [col. 7, lines 58-64] and element 31 uses all of the signal values [col. 8, lines 10-15]). The Office asserts that Kubo teaches identifying the pixel data signals in each set of pixel data signals with at least a first characteristic and restricting the application of the filters to the unidentified pixel data signals in each set of pixel data signals (referred to as masking; fig. 7, step #10). Further, the Office asserts that it is well known in the art to change RGB signals to R-G, B-G, and Y channels (also known as Cr, Cb, Y) and takes Official Notice of this. The Office asserts that Kubo fails to disclose using a color-space

transformation to the sets of pixel signal before the step of applying a filter, but asserts that Spaulding it would be advantageous to use, for example, CIELAB for the purpose of correcting the multi channel signals of the camera system to produce the desired output signals (col. 8, lines 53+; and col. 7, lines 63+). The Office asserts that this would be useful before performing the actual filtering process so that an accurate signal would be produced and detection of the defective signals would be easier to detect and thus asserts that it would have been obvious to one having ordinary skill in the art to use color-space transformation to the sets of pixel data signals before the step of applying a filter.

Kubo, Spaulding, and Applicant's allegedly conceded prior art, alone or in combination, do not disclose or suggest, "applying a different filter to each of the sets of pixel data signals" as recited in claim 1, "the applying further comprises applying a different filter to each of the sets of pixel data signals" as recited in claim 19, "a filter system comprising at least three different filters, each of the filters filtering a different one of the sets of pixel data signals for one of the channels" as recited in claim 25, or "a different one of the filters is applied to each of the sets of pixel data signals" as recited in claim 35.

The Office's attention is respectfully directed to FIG. 7 and to col. 8, lines 6-18 in Kubo, which illustrate and disclose that the B- pixel signals are processed in the same manner as the R-pixel signals. The B-pixel signals and the R-pixel signals are both processed with the same average interpolation filters 31. Kubo does not disclose or suggest applying a different filter to each of the RGB pixel signals. Like Kubo, neither Spaulding nor Applicant's allegedly conceded prior art disclose or suggest applying a different filter to each of the sets of pixel data signals as claimed.

As disclosed at page 6, lines 2-4, in the above-identified patent application, "[T]he present invention significantly reduces noise through an adaptive filtering technique which adjusts or customizes the filter for each channel of the image." Additionally, as disclosed at page 9, lines 26-28 in the above-identified patent application, "[T]he image processing system 14 is programmed with a filtering process which customizes the filter for the pixel data signals for each channel." Further, as disclosed at page 11, lines 19-23 in the above-identified patent application, "By adjusting and applying the median filters independently in each image channel in the imaging system, each filter can be customized to that image plane, eliminating the need to over-filter some planes and/or leaving objectionable artifacts in other planes." Accordingly, in view of the foregoing amendments and remarks,

the Office is respectfully requested to reconsider and withdraw the rejection of claims 1, 19, 25, and 35. Since claims 2-9, 40, and 41 depend from and contain the limitations of claim 1, claims 20-22 depend from and contain the limitations of claim 19, claims 36 and 37 depend from and contain the limitations of claim 35, and claims 26-28 depend from and contain the limitations of claim 25, they are distinguishable over the cited references and are patentable in the same manner as claims 1, 19, 25, and 35.

Kubo, Spaulding, and Applicant's allegedly conceded prior art, alone or in combination, do not disclose or suggest, "applying a color-space transformation to the sets of pixel data signals before the step of applying a filter" as recited in claim 7, "transforming the red, green, and blue channels to an achromatic channel and two chrominance channels, wherein the achromatic channel and the two chrominance channels each comprise a set of pixel data signals . . . applying a filter to each of the transformed sets of pixel data signals" as recited in claim 10, "applying a color-space transformation to the sets of pixel data signals before the step of applying a filter" as recited in claim 24, "a transformation system . . . transforms the red, green, and blue channels to an achromatic channel and two chrominance channels, wherein the achromatic channel and the two chrominance channels each comprise a set of pixel data signals . . . a filter system comprising at least two different filters, each of the filters filtering at least one of the transformed sets of pixel data signals" as recited in claim 29, or "a transformation system coupled to the image sensor apparatus which transforms the red, green, and blue channels to an achromatic channel and two chrominance channels before the filter system applies the filters" as recited in claim 38.

As the Office has acknowledged, Kubo does not disclose using a color-space transformation to the sets of pixel signal before the step of applying a filter. Additionally, as the Office has asserted, Spaulding discloses at col. 7, lines 63+ and at col. 8, lines 53+ that a color-correction transformation determining process is performed before the signals are output. However, nowhere does Spaulding teach or suggest applying a color-space transformation before applying the step of filtering. There is no basis for the Office's position that applying a color-space transformation to the sets of pixel data signals would be useful before performing the actual filtering process, except from the above-identified patent application. Like Kubo, neither Spaulding nor Applicant's allegedly conceded prior art disclose or suggest applying a color-space transformation to the sets of pixel data signals before the step of applying a filter as claimed.

More specifically, as disclosed at page 6, lines 4-6 in the above-identified patent application, “The present invention is able to further improve the quality of the image by applying a color-space transformation before the filtering operation.” Additionally, as disclosed at page 12, lines 2-10 in the above-identified patent application, “The method disclosed here and programmed into the memory 16 for execution by the CPU 18 converts the pixel data signals from red, green and blue channels to an achromatic (luminance) and two chromatic (chrominance) channels before filtering. The transformations allow important optimizations in the filtering process. The subjective percept of ‘sharpness’ is based largely on the high-frequency luminance information in an image, so minimizing filtering in that channel maximizes subjective image quality. More aggressive filtering by the imaging system 10 is then possible in the chrominance channels with less reduction in subjective image quality.” Further, as disclosed at page 16, lines 2-8 in the above-identified patent application, “Enhanced image quality is evident in Figures 8B, 9B, and 10B, but the improvement in the blue channel shown in Figure 10B is the most dramatic in this particular embodiment. This particular example demonstrates the utility of transforming the image to a luminance/chrominance color space in the imaging system 10 before filtering. The mask/filter technique can be applied directly to RGB image planes to limiting filtering artifacts, but noise reduction is less dramatic.” Accordingly, in view of the foregoing amendments and remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 7, 10, 24, 29, and 38. Since claims 11-16, 42, and 43 depend from and contain the limitations of claim 10 and claims 30-32 depend from and contain the limitations of claim 29, they are distinguishable over the cited references and are patentable in the same manner as claims 10 and 29.

Kubo, Spaulding, and Applicant’s allegedly conceded prior art, alone or in combination, do not disclose or suggest, “restricting the application of the filters to the unidentified pixel data signals in each set of pixel data signals” as recited in claim 8, “restricting the application of the filters to the unidentified pixel data signals in each set of pixel data signals” as recited in claim 15, “applying a filter to the identified pixel data signals in each of the sets of pixel data signals, wherein the applying the filter is restricted to the identified pixel data signals” as recited in claim 17, “a filter system applying a filter to the unidentified pixel data signals in each of the sets of pixel data signals, wherein the applying the filter is restricted to the identified pixel data signals” as recited in claim 33, “restricting the application of the filters to the pixel data signals in the unidentified pixels in the set of

pixels for the sensor” as recited in claim 40, or “restricting the application of the filters to the pixel data signals in the unidentified pixels in the set of pixels for the sensor” as recited in claim 42.

Contrary to the Office’s assertions, Kubo does not teach or suggest identifying the pixel data signals in each set of pixel data signals with at least a first characteristic and restricting the application of the filters to the unidentified pixel data signals in each set of pixel data signals in the masking in step #10 in FIG. 7. As the Office has noted, Kubo discloses a masking step at step #10 in FIG. 7. However, the Office’s attention is respectfully directed to col. 8, lines 19-21 in Kubo which states, “The above-described processing for interpolation is repeated for each of the pixels of each of the images obtained from the masking (emphasis added). Accordingly, in Kubo the interpolation filters are applied to all of the pixel signals. Kubo does not disclose or suggest restricting the application of the interpolation filters to the unidentified pixel data signals. Like Kubo, neither Spaulding nor Applicant’s allegedly conceded prior art disclose or suggest restricting the application of the filters to the unidentified pixel data signals in each set of pixel data signals as claimed

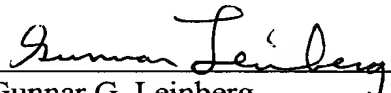
In view of the foregoing amendments and remarks, the Office is respectfully requested to reconsider and withdraw the rejection of claims 8, 15, 17, 33, 40, and 42. Since claim 9 depends from and contains the limitations of claim 8, claim 16 depends from and contains the limitations of claim 15, claims 18-24 depend from and contain the limitations of claim 17, claims 34-39 depend from and contain the limitations of claim 33, claim 41 depends from and contains the limitations of claim 40, and claim 43 depends from and contains the limitations of claim 42 they are distinguishable over the cited references and are patentable in the same manner as claims 8, 15, 17, 33, 40, and 42.

Applicant has added new dependent claims 44-46 which are believed to be distinguishable over the cited references and in condition for allowance. A notice to this effect is respectfully requested.

In view of all of the foregoing, applicant submits that this case is in condition for allowance and such allowance is earnestly solicited.

Respectfully submitted,

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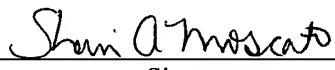
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